PATENT SPECIFICATION
DRAWINGS ATTACHED

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COMPLETE SPECIFICATION

Method and Apparatus for the Laying of Railway Tracks

We, MATISA MATERIEL INDUSTRIEL S.A. of Grand-Pont 2, Lausanne, Switzerland, a Corporation organised under the laws of the Confederation of Switzerland, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

The present invention relates to a method and apparatus for the laying of railway tracks and more particularly to a method and means for the laying of a new track formed of welded sections of great length in the place of an existing track, for example an old track.

An object of the present invention is to provide an easy and rapid means for laying tracks formed of welded long sections in the place of an existing track and in cases where the supporting sleepers of the permanent way are provided with grooves for receiving the rails.

Broadly the invention comprises a method of laying a railway track comprising in sequence the following steps:

a) Laying long sections of welded rail alongside and outside an existing track to constitute a broader gauge track;

b) Progressively lifting the existing rails from the sleepers or other rail support and progressively displacing them inwardly to form a track of reduced gauge and;

c) Progressively lifting the long sections of welded rail and moving them inwardly onto the supports of the existing rails which have already been moved in accordance with step b).

Conveniently the method may be carried out by steps in which the existing rails are lifted by means supported on the long welded rails and are then displaced inwardly by further means supported upon the welded rails and lowered by means onto the track support to form a track of reduced gauge, lifting the long welded rails by means supported on the existing rails after they have been reduced in track gauge, said means also serving to displace the long welded rails inwardly and to lower them onto the track support to provide a permanent track of the required normal track gauge.

For the purpose of carrying out the method of the invention the apparatus for the progressive laying of a railway track comprises a first device including a frame member, means on the frame member for permitting movement along rails of larger track gauge than the ultimate track gauge desired, a second device which includes a frame member and means provided on said frame member for permitting movement along the said rails of larger track gauge, and a third device comprising a frame member having means provided thereon for permitting movement thereof along rail members of reduced track gauge relative to the track gauge ultimately desired.

Conveniently the apparatus also includes a fourth device adapted for movement along the newly laid track having the required normal track gauge said device being provided with means for checking and if necessary accurately locating the rails to the correct normal track gauge.

Other features of the invention will be apparent from the description which follows of one form of apparatus suitable for carrying out the method of the invention.

In the drawings:

Figure 1 schematically illustrates a side view of tracks in the process of being exchanged by means of an installation according to the present invention;

Figure 2 is a schematic illustration in plan of the installation shown in Figure 1;

Figure 3 is an end view showing details of a preferred embodiment of the first element or device of the installation of the present invention;

Figure 4 is a fragmentary side view of the device shown in Figure 3;

Figure 5 illustrates a detail of a portion of the first element depicted in Figures 3 and 4;

Figure 6 is a sectional view taken along the lines VI—VI of Figure 5;

Figure 7 is a front view of a portion of the second element or device of the installation according to the present invention, for convenience of illustration only depicting one-half of such device taken from the centre-line thereof;

Figure 8 is a fragmentary view of a portion of the element or device depicted in Figure 7 showing details thereof;

Figure 9 is a fragmentary front view of an embodiment of the third element or device of the installation according to the present invention;

Figure 10 is a side view of an embodiment of the fourth element or device of the installation according to the present invention; and

Figures 11a, 11b and 11c schematically illustrate the different positions occupied by the temporary and permanent rails during the course of the different operational steps for track laying carried out by means of the installation of the present invention.

Referring now to the drawings and, more particularly, to Figures 1 and 2, these schematically depict the "substitution stage" of the track laying method of the present invention. Figures 1 and 2 show from the side and top, respectively, the relevant construction site as well as the installation designed according to the invention for carrying out the aforesaid substitution stage. The long welded rails are represented in these Figures by reference numeral 1 and are depicted in full lines. These long welded rails 1 are provided for forming the final or permanent track. The rails of the temporary track have been shown in broken lines and are denoted by reference numeral 2.

In the course of a preceding or preparatory stage, after the laying of temporary track sections which may be formed of pre-assembled lengths of temporary rails for which new sleepers or ties are employed, which rails are connected together with these ties, and, as the case may be, can also be re-used and are laid with normal or standard track gauge, permanent rail members are laid at both sides externally of and parallel to these temporary rails, which permanent rails rest on the ends of the new ties. These permanent rails provide a runway or roller track of a larger track gauge than the normal or standard track gauge. These long rails are spacedly guided and located by special rail chairs or supports secured to the ties or sleepers, and which will be discussed in greater detail hereinafter.

In the course of the substitution stage there is a first working or operational step which is carried out with the aid of an element or device of the invention, which for convenience in description has been termed the "first device or element" and is generally represented by reference numeral A. This first working step embodies the operation of vertically raising the temporary rail 2 out of the rail seats of the ties, at the location represented by reference numeral 4, whereby such rails rest against guide rollers, to be described fully later, supported by the element or device A which rolls upon the track 1 of large track gauge.

A second working or operational step, carried out with the aid of the so-called "second device or element" B which likewise rolls upon the track 1 of large gauge, embodies the step of horizontally displacing the raised temporary rails 2 towards the centre of the track. Such displacement is carried out at location 5 of the second device or element B, as will be fully explained hereinafter, by means of guide rollers carried by said second element in a manner such that the aforesaid temporary rails resting upon the ties form a track 6 of reduced track gauge, or small track gauge, which extends between and parallel to the rails 1 of large track gauge.

During the course of a third working or operational step, carried out with the aid of a so-called "third device or element" C which rolls upon the track of reduced or smaller gauge, there is performed the operation of vertically raising the permanent rails, as generally depicted by reference numeral 7, in order to free such from the special rail chairs or supports and to place them upon guide rollers carried by the element C, as will also be explained in detail hereafter. The fourth working or operational step consists of laying the final or permanent rails in the rail seats or supports of the ties or sleepers at the location 8 where such rails again contact the roadbed or surface on the other side of the element C, whereby there results a final or permanent track generally depicted by reference numeral 9.

Advantageously, a "fourth device or element" D whose chassis or wheel frame possesses a normal or standard track gauge, rolls upon such permanent track and checks the position of the permanent rails with the aid of rollers which, as the situation may require, take care of the accurate relative location of these rails.

Referring now in detail to Figures 3 to 6 depicting details of the construction of the first device or element A, it will be seen that such is formed from a rectangular frame 20

advantageously assembled from profiled metal beams or supports. In the region of each corner of the frame 20 there is arranged a holder or support 21 for a respective wheel 22, whereby each holder 21 is constructed to slide in a direction parallel to the axis of the associated wheel 22 and vertically to the axis of the track upon which rolls the first device or element A. In the here described embodiment, each holder 21 comprises two parallel plates 23 (Figures 5 and 6) which are connected to one another through the agency of the shaft 24 of the associated wheel 22, whereby these plates 23 are arranged between two slide bars or rails 26 formed of two U-shaped profile support members of the longitudinal member of the frame 20. A hand grip or handle 27 which is connected to the holder or support 21 permits displacement of said holder between these slide rails or bars 26 and allows for a change of the wheel gauge of the forward and rearward roller pairs, whereby the holder 21 can be locked in selected position with the help of a movable rod or pin 28 which, on the one hand, traverses said holder by means of a suitable bore and, on the other hand, traverses the slide rails 26, in a manner shown in Figure 5.

The cylinder housing of a piston-cylinder drive generally represented by reference numeral 30 and which is supplied from a suitable pump 32 (Figure 3) actuated through the agency of a lever 33, is rigidly connected with the frame 20 at substantially its central or middle region. The piston-cylinder drive 30 includes a vertically arranged piston rod 34 which is secured to a central platform 36, of which the latter can thereby be displaced towards or away from the frame 20. The platform 36 is mounted for rotation about a vertical axis at the end of the piston rod 34, as shown. Due to lowering of this central platform 36 until it comes into contact with the ground or road-bed, then through further extension of the piston-cylinder drive, it is possible to raise the frame 20 from the rails upon which such normally rests, for the purpose to be explained shortly hereinafter.

At both sides of the centrally oriented piston-cylinder drive 30 there are arranged two levers 42 (Figures 3 and 4) which are operably articulated or hingedly connected at one respective end with the frame 20 about a common pivot axis perpendicular to the longitudinal or lengthwise axis of said frame. This common axis can be realized by the provision, for each separate lever 42, of a bolt member 43 which interconnects two uprights or posts 44, of which only one is visible in F—c 3, secured to the aforesaid frame 20. The respective free ends of the levers 42 are connected to one another through the agency of a metal tube or pipe 45 or the like which is welded or otherwise suitably connected to these levers 42, in a manner best shown in Figure 4.

A column member 47 is pivotably connected to each lever 42 at location 48, whereby the lower end of each such column 48 forms a knife edge and rests against a support or bearing surface 52 formed by a portion of the platform 36. In the neighbourhood of each end of the metal tube or pipe 45 there is suspended from said tube a lifting arm 54 through the intermediary of a respective stirrup 55 which encompasses the associated end of the tube 45. Each lifting arm 45 terminates at its lower end with a tong or clamp 56 constructed to engage a railhead. The projections 57 appearing on the tube member 45 fix the position of the stirrup 55 relative to the aforesaid tube member, and they are arranged in such a manner that the spacing between the tongs 56 in the different positions determined by these projections 57 corresponds to the standard or normal and the reduced gauge of the railroad track.

In this arrangement, when the central platform 36 is brought to the level of the underface of the frame 20, the lifting arms 54 are height of the frame 20, as illustrated in Fig- height of the frame 20, as illustrated in Figure 4. When the platform 36 is lowered the tongs 56 are also simultaneously lowered and can be brought to a suitable height for engaging the rails which are vertically positioned beneath such tongs 56. The frame 20 also carries beneath its underface, in the vertical region beneath each of the lifting arms 54, a vertical arm 60 (see Figure 3) which is rotatably mounted to the frame 20 for turning about its vertical axis. The lower end of each vertical arm 60 carries a horizontal shaft 61 to which is secured a freely rotatable roller 62, having a supporting or bearing surface which runs conically towards the associated arm member 60.

The roller member 62 due to pivoting about its associated arm member 60 can essentially assume two operable positions, that is, a support or carrying position in which it is vertically disposed beneath the associated lifting tongs 56 as well as beneath the raised track when such is necessary, and a so-called free or release position in which it completely renders free or unobstructed the space beneath these tongs 56. In this manner, and as will be apparent from subsequent details, it is possible to raise each of the rails through the agency of the lifting arms 54 when the roller 62 is in its free position in order to raise such rails above the level of the bearing surface of the aforesaid roller, then to pivot such roller 62 into its support or carrying position and then to lower the associated rail until it comes into contact with this roller, with simultaneous release of the corresponding tong or clamp 56. The rail 2 is

shown in Figure 3 in this just described position.

As can further be seen from Figure 3, two further rollers 64 and 65 provided with vertically extending axes are arranged beneath the frame 20 and are operably associated with each rail-carrying roller 62. These rollers 64 and 65 are arranged in such a manner that they laterally guide the rail 2 which has been raised in the manner previously described, in that these rollers 64 and 65 correspondingly bear against the railhead and rail flange, respectively, at opposite sides of the rail 2, in the manner clearly shown in Figure 3. The rollers 64 and 65 as well as the support for the conical roller 62 are carried by means of a suitable slide or carriage 26a which is laterally displaceable in the frame 20 and the position of which can be selectively locked, as desired, by means of a suitable screw adjustment (not shown). All of the rollers can be pulled upwardly through the aid of vertical guide rods provided with hand grips 67.

By referring to Figures 7 and 8 the details of the second device or element B, now to be described, can readily be ascertained. The second device or element B, which for convenience in illustration only one-half of which is shown in Figure 7 is generally more or less similarly constructed as the first device or element A insofar as concerns the frame and the roller members of this last-mentioned element. The frame of the second device or element B likewise supports a central platform 36a corresponding in structure to platform 36, the movement of which is generated by means of a hydraulic cylinder-piston drive, generally represented by reference numeral 30a and in a manner as described in conjunction with the device A. On the other hand, the second device or element B is not provided with the previously described lifting members, that is levers 42 and lifting arms 54 for the rails, as was the case with the device or element A. A further important difference resides in the following described arrangement, manifested in that a pair of roller pairs 71 and 72 having vertical axes are arranged beneath the frame 20a of the element B in the region of its side or lateral marginal edges. These rollers 71 and 72 are appropriately mounted at the ends of the arms 73 and 74 which are displaceably arranged on the frame 20a of element or device B. The rollers 71 and 72 can advantageously be brought to the same height and the distance between the roller surfaces of both said rollers 71, 72 of each roller pair is then somewhat larger than the width of the head of a rail 2 (Figure 8).

Each pair of rollers 71 and 72 is mounted, in a manner similar to the rollers 62, 64 and 65, upon a slide or carriage represented in Figure 8 by numeral 76. The slide member 76 is constructed to be laterally displaceable through the agency of a suitable adjusting screw (not shown). In this manner, the spacing between the respective pairs of rollers 71, 72 can be adjusted, particularly to a value corresponding to the reduced track gauge or width of the track. Each of the rollers 71 and 72 are also capable of being pulled upwardly with the aid of the vertically arranged guide rods 77 adapted to be displaced by means of the hand grips 78. When such is done the rollers 71 and 72 then assume the position depicted in Figure 7.

The third device or element C, which likewise for convenience in illustration has only been partially shown in Figure 9, is generally more or less similarly constructed as the device or element A and substantially exhibits corresponding but somewhat differently arranged members. Thus, an inspection of Figure 9 will reveal that, the third device or element C is provided with a frame 80 similar to frame 20 of element A, which carries four wheels 82, the holders or supports 81 of which are displaceably mounted on the aforesaid frame 80 in the manner of the holders or supports 21 previously described in conjunction with the description pertaining to device A. The wheel holders 81 in this embodiment can be locked in a position corresponding to the reduced and the normal or standard gauge of the track, respectively. The frame 80 also carries the displaceable carriage means of slide 26b for the groups of rollers 92, 94 and 95 corresponding to the rollers 62, 64 and 65 of the device or element A. Each of the groups of rollers 92, 94 and 95 in this embodiment, however, being arranged externally of the associated wheels 82 in order to be capable of being brought into a vertical position above the rails of a track of large track gauge or width. Hand grips 67a similar to the hand grips 67 of Figure 3 are also provided for the rollers 92, 94 and 95.

Finally, the frame member 80 of the device or element C is also provided with a central platform 96 which corresponds to the platform 36 previously described, and which is displaced by means of a cylinder-piston drive generally denoted by numeral 30b, which can be hand-actuated as previously explained, and which is connected with the non-illustrated levers, arms and lifting tongs, corresponding to the levers 42, arms 54 and tongs 56 of the element A; omitted in Figure 9 to provide clarity in illustration. The tongs of the element C are however arranged in such a manner that they can be brought vertically above the rails of the track of large track gauge or width.

The installation according to the present invention, in addition to the three previously described devices or elements A, B and C, can advantageously encompass a fourth

device or element D, shown in detail in Figure 10, now to be described. The device or element D is formed by a light-weight carriage or cart constructed to roll upon a track of normal track gauge, such as generally represented by carriage 97, at the front side of which two vertical arms 98 are connected serving as supports for two rail-guide rollers 99, only one of which is visible in Figure 10. The guide rollers 99 are arranged at the height of the railheads upon which the carriage 97 rests and their respective roller surfaces exhibit a spacing from one another which corresponds to the spacing between the outer surface of one railhead of a normal gauge track and the outer surface of the other railhead of the same track (see Figure 2).

Figures 11a, 11b and 11c schematically illustrate the relative positions of the temporary rails 2 and the permanent rails 1 during the course of the various stages of track laying or substitution.

In Figure 11a there is illustrated the position of the temporary rail 2 at its location in the rail seat 101 of the tie or sleeper 102 and forms together with the other rail which is symmetrical to it a track of normal or standard gauge (see also Figure 2). The rail 1 in long welded sections is arranged externally of the rails 2 of this track and rests on the respective ends of the cross-ties or ties 102. The rail 1 is spacedly guided in rail chairs or supports 103 which are supplied or otherwise seated upon the ties 102 and forms together with its opposed rail a track of large track gauge (see Figure 2).

In Figure 11b the rail 2 is shown in a position where it has been removed from the rail 101 and displaced towards the middle of the crosstie or tie 102, in order to form together with the likewise displaced, opposite cooperating rail a track of reduced track gauge or width. In this Figure, the rail 1 has remained in the previously described position, as indicated. In Figure 11c the rail 2 has not changed its position, but the rail 1 has been raised out of the rail chairs 103 and has been brought into its final position at the rail seat 101 of the tie 102.

The devices or elements of the installation designed according to the invention, which are coupled together to provide a train and which are pulled by a tractor or the like, are guided to the previously laid standard or normal gauge track at the beginning of the laying or construction site and are separated or uncoupled from one another.

The device or element A is then guided to the junction or transition point of the track which forms the boundary between the previous and the subsequent construction site. This device A is thereafter raised with the aid of the central platform 36 which is operatively fastened or wedged to a tie until the wheels 22 are raised from the rails. The wheels 22 are then laterally displaced until they are disposed vertically above the rails 1 of long welded sections of the outer track of large track gauge or width. The device or element A is then again lowered by retracting the platform 36, so that the wheels 22 now bear on this outer track of large gauge. Then, during such time as the platform 36 is still in its lower position, the ends of the temporary rails 2 are suspended in the rail-lifting tongs or clamps 56. These rails are then raised by means of the cylinder-piston drive 30. The conical rail-carrying rollers 62 are pivoted beneath those temporary rails 2 into their carrying or support position. During such time as the central platform is lowered a small amount the temporary rails are freed or released from the lifting tongs 56, whereupon the central platform 36 is returned into its rest position. The rollers 64 and 65 are lowered into their correct position at both sides of the temporary rail 2. The device or element A and the rails 1 and 2 are thus located in the position illustrated in Figure 3.

The device A is displaced a given distance towards the interior of the construction site until the ends of the temporary rails 2 more or less contact the roadbed or surface. Then the device or element B which rolls upon the previously laid permanent track is rolled to the start of the construction site. This element B is then raised with the aid of the central platform 36a and the wheels thereof are displaced from the normal or standard track gauge to the wide track gauge. The element B is then subsequently placed on the track with large track gauge. Directly after this working step, the third device or element C is brought on the normal or standard track to the start of the construction site, raised and adjusted so that its wheels exhibit reduced track gauge or width.

The guide rollers 71 and 72 of the device or element B are then lowered at each side of this device and at both sides of the free end of the corresponding temporary rails 2 (Figure 8), and then laterally displaced towards the middle of the ties 102 in order to bring the ends of the temporary rails 2 to a reduced track gauge or width.

The guide rollers 71 and 72 of the device or element B are then lowered at each side of this device and at both sides of the free end of the corresponding temporary rails 2 (Figure 8), and are then laterally displaced towards the middle of the ties 102 in order to bring the ends of the temporary rails 2 to a reduced track gauge. The element B is then conducted towards the interior of the construction site and is coupled together with the element A.

The device or element C which is located vertically above the start of the track of

reduced gauge formed of the temporary rails 2 is lowered onto this track. Then the ends of the long welded rails which are to be brought into their final or permanent location are suspended in the lifting tongs of the aforesaid element C. The long rails are then raised in this manner. At the end of a work cycle corresponding to that described with respect to the device or element A, and after the extension of the rollers 92, 94 and 95, the device or element C is located in the position shown in Figure 9, wherein its wheels rest on the rails 2 of reduced gauge and the rails 1 of welded sections rest upon the rail-carrying rollers 92. The element C is then coupled to both of the previous elements B and A and the thus formed train is pulled towards the interior of the construction site. The free ends of the rails 1 are manually displaced towards the centre of the track and brought into alignment with the ends of the permanent track of the previous laying or construction site.

The device or element D which has been brought up on the previously laid track is applied to the rails 1 of the track under construction, whereby the position of these rails are checked by the guide rollers 99 of this last-mentioned element D. The element D is then coupled to the other elements. In order to remove the individual elements of the installation from the construction site, the previously described working steps are executed in reverse sequence, so that the entire installation at the end of these working steps are located on a track of normal or standard gauge and can then be rolled to a suitable storage location.

It is to be mentioned that in the event that the storage location is too far removed from the construction site, it is possible to raise each of the devices or elements A, B and C with the aid of its corresponding central platform 30, 30a and 30b, respectively, in order to raise the wheels thereof from the rails and to then pivot such respective element through 90 degrees on its associated platform. It will be recalled, and as previously described, each of these platforms are rotatably secured at the end of their associated piston rod. The appropriate element or device is then lowered so that its wheels can come to rest on track sections which are laid perpendicular to the standard or normal track and which permit the aforesaid element to be brought to a temporary storage location adjacent the track. It is to be appreciated that in the preparatory y phase of the process of track laying or substitution there can be employed pre-assembled lengths made up with temporary rails advantageously supported on new ties at a normal or standard track gauge which are then transported to the laying or construction site and are subsequently replaced by the permanent rails. It is also conceivable to work with the old rails of the track to be renewed or laid, after advantageously replacing the old ties with new ones, which old rails are then subsequently replaced by the permanent rails.

WHAT WE CLAIM IS:—

1. A method of laying a railway track comprising the following steps:

a) Laying long sections of welded rail alongside and outside an existing track to constitute a broader gauge track;

b) Progressively lifting the existing rails from the sleepers or other rail support and progressively displacing them inwardly to form a track of reduced gauge, then

c) Progressively lifting the long sections of welded rail and moving them inwardly onto the supports of the existing rails which have already been moved under step b).

2. A method as claimed in claim 1 in which the existing railway track comprises temporary rails which are laid to give a normal track gauge.

3. A method as claimed in claim 1 or 2 in which the long welded rails are located on the supports previously provided for supporting the existing rails.

4. A method as claimed in claim 1, 2 or 3 in which subsequent to step c) the long welded rails are checked and aligned to provide the correct normal track gauge.

5. A method as claimed in any preceding claim in which the existing rails, after having been removed to a reduced track gauge, are removed.

6. A method as claimed in any preceding claim in which the existing rails are lifted by means supported on the long welded rails and are then displaced inwardly by further means also supported upon the permanent rails and lowered by means on to the track support to form a track of reduced gauge, lifting the long welded rails by means supported upon the existing rails after they have been reduced in track gauge said means also serving to displace the long welded rails inwardly and to lower them on to the track support to provide a permanent track of the normal track gauge.

7. Apparatus used in the progressive laying of a railway track by the method of claim 1 comprising a first device including a frame member and means on the frame member for permitting movement along rails of larger track gauge than the ultimate track gauge desired, a second device which includes a frame member and means provided on said frame member for permitting movement along the said rails of larger track gauge than the ultimate track gauge desired, and a third device comprising a frame member having means provided thereon for permitting movement thereof along rail members of reduced track

gauge relative to the track gauge ultimately desired.

8. Apparatus as claimed in claim 7 including a fourth device comprising a frame member having means for permitting movement along the permanent newly laid track of normal track gauge and having means for checking and if necessary accurately locating the rails to the correct normal track gauge.

9. Apparatus as claimed in claim 8 in which the checking means comprises a pair of guide roller members mounted in spaced relationship to said frame member of said fourth device at a distance substantially corresponding to the required normal track gauge and adapted to engage the laid rails to align them to the correct normal track gauge.

10. Apparatus as claimed in claim 7, 8 or 9 in which the means provided on any or all of the first, second, third and fourth devices for movement along the track comprise rollers or wheels.

11. Apparatus as claimed in claim 10 in which there is provided on the first, second and third devices slidable housing means cooperating with each of the wheel means to alter the wheel gauge for accommodation of the said devices to the track gauge required.

12. Apparatus as claimed in claim 11 in which the slidable housing for the first and second device are displaceably arranged on the associated frame member for shifting the said wheels or rollers from a normal track gauge to a larger track gauge, and the slidable housing means for the wheel or roller means on the third device is displaceably arranged on the frame member for shifting the wheel or roller means from one track gauge to a smaller track gauge.

13. Apparatus as claimed in any one of claims 7 to 12 in which the first, second and third devices each include a platform member mounted for vertical movement relative to the frame member and drive means for effecting said vertical movement.

14. Apparatus as claimed in claim 13 in which each of the platform members is operatively connected to the drive means for rotation about a vertical axis relative to the frame member each of said drive means being adapted to raise its frame member from the rails upon which the frame member rides by the lowering of the platform member whereby the appropriate device can be rotated through a predetermined angle to permit removal thereof laterally of the rails upon which the device is supported.

15. Apparatus as claimed in claim 13 or 14 in which the drive means comprises an hydraulic piston cylinder drive.

16. Apparatus as claimed in any one of claims 7 to 15 in which the said first and third device each include rail lifting means, the rail lifting means of the first device being adapted to lift the rails of the existing track and the rail lifting means of the third device being positioned to lift the long welded rails lying outside the said existing track.

17. Apparatus as claimed in claim 16 in which the rail lifting means on the said first and said third devices each include a pair of rail lifting tongs mounted for vertical displacement between an upper and lower position.

18. Apparatus as claimed in any one of claims 7 to 17 wherein rail lifting means are provided on the said first and third device said means including lever means operable with the said drive means for each platform member thereof for displacing the said tongs according to the position of the platform member relative to its supporting frame member.

19. Apparatus as claimed in any one of claims 7 to 18 in which the first and said third devices each include rail supporting means for supporting the rails lifted by the respective rail lifting means.

20. Apparatus as claimed in claim 19 in which the rail supporting means includes a separate rail carrying roller member disposed beneath each rail lifting tong and means operatively connected to each rail supporting roller for displacing it into either an operative position beneath its associated tong for carrying a rail lifted by such tonge or an inoperative position in which position there is provided an unobstructed path of travel for the associated tong for movement into its rail lifting position.

21. Apparatus as claimed in claim 19 or 20 in which the rail supporting means includes a pair of cooperating guide rollers for each rail carrying roller member disposed laterally to guide a rail at opposite sides thereof and which is supported by the associated rail carrying roller member.

22. Apparatus as claimed in claim 21 in which the said rail supporting means also includes slide means for each rail carrying roller member and its associated pair of cooperating guide rollers for horizontally moving all the said rollers to laterally displace a rail when engaged by said rail supporting means.

23. Apparatus as claimed in claim 22 in which each rail supporting means includes manual means for vertically displacing each pair of cooperating guide rollers.

24. Apparatus as claimed in any one of claims 19 to 23 in which the rail supporting means of the first device are disposed adjacent the inner side of the means permitting movement beneath the associated rail lifting means and the rail supporting means of the third device are disposed externally of the means permitting its movement beneath the associated rail lifting means.

25. Apparatus as claimed in any one of

claims 7 to 24 in which said second device includes two pairs of cooperating guide rollers each pair including roller members spaced at a distance from one another corresponding substantially to the width of the rail head to be engaged and means operatively connected with each such pair for laterally shifting them to adjust the spacing between each pair of cooperating guide rollers.

26. Apparatus as claimed in claim 25 in which the operatively connected means includes means permitting the vertical displacement of the guide rollers.

27. Apparatus for track laying substantially as described with reference to the accompanying drawings.

28. A method of track laying substantially as described with reference to the accompanying drawings.

29. Tracks when laid by the method claimed in any one of claims 1 to 6 and 28.

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FIG.1

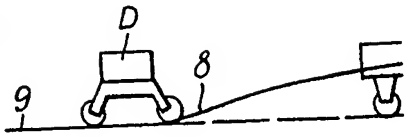


FIG.2

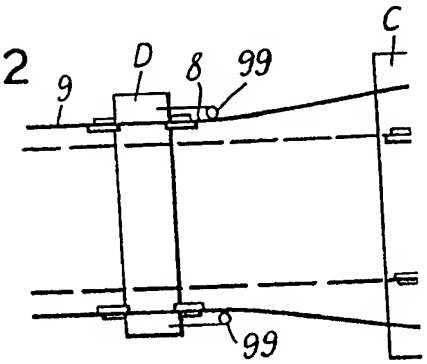
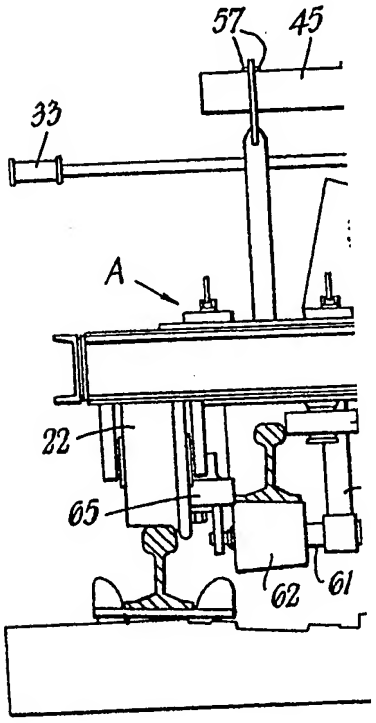


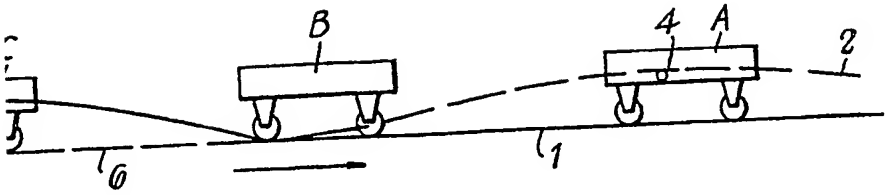
FIG.3

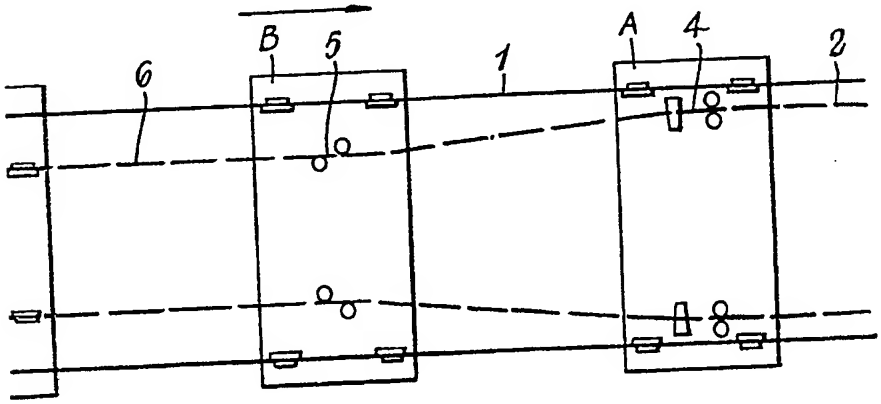


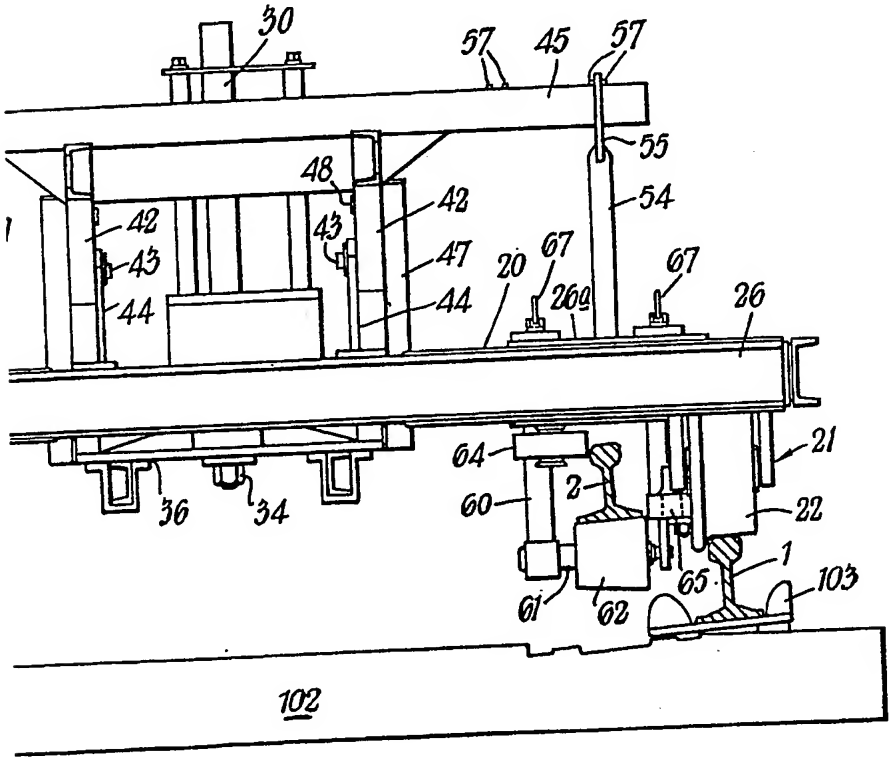
1,020,111 COMPLETE SPECIFICATION
4 SHEETS

This drawing is a reproduction of the Original on a reduced scale.

SHEET 1







1,020,111 COMPLETE SPECIFICATION
4 SHEETS

FIG.1

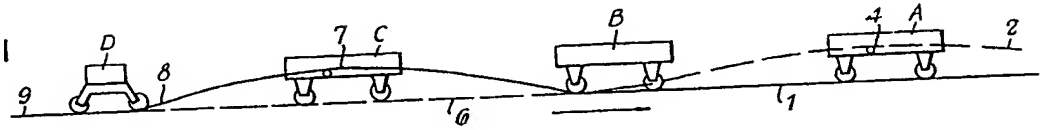


FIG.2

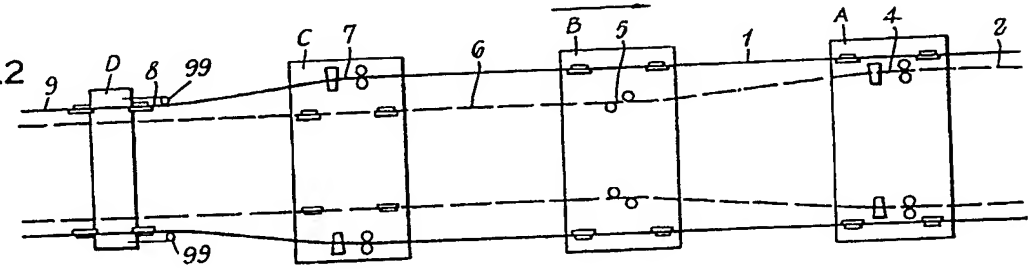


FIG.3

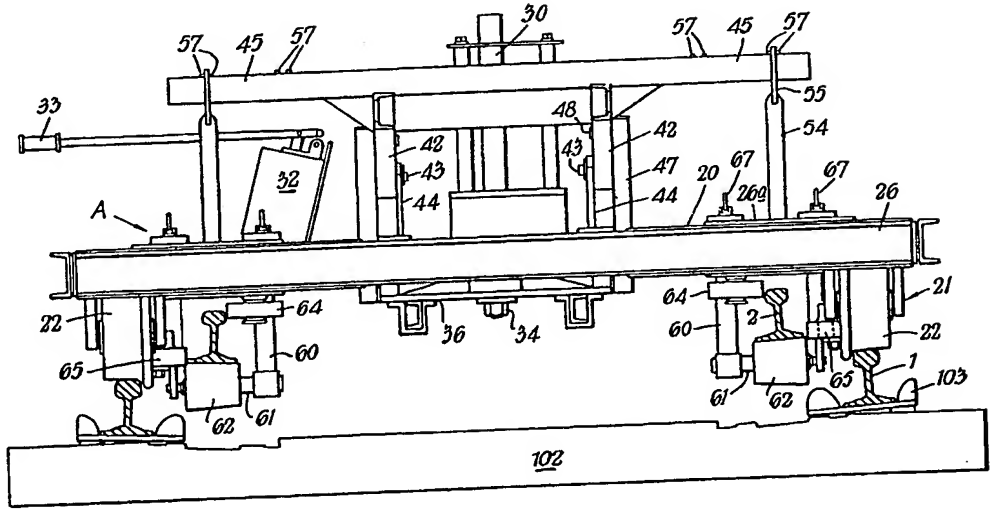


FIG.4

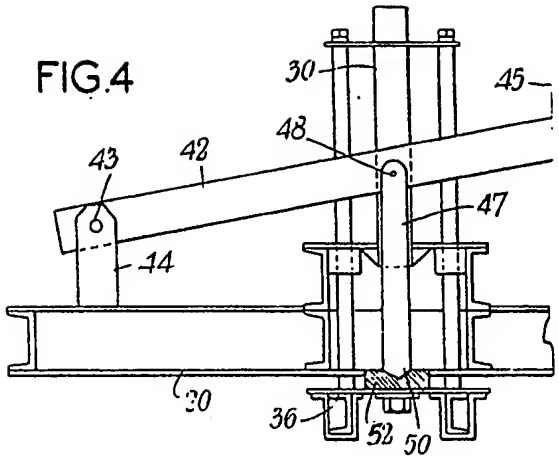
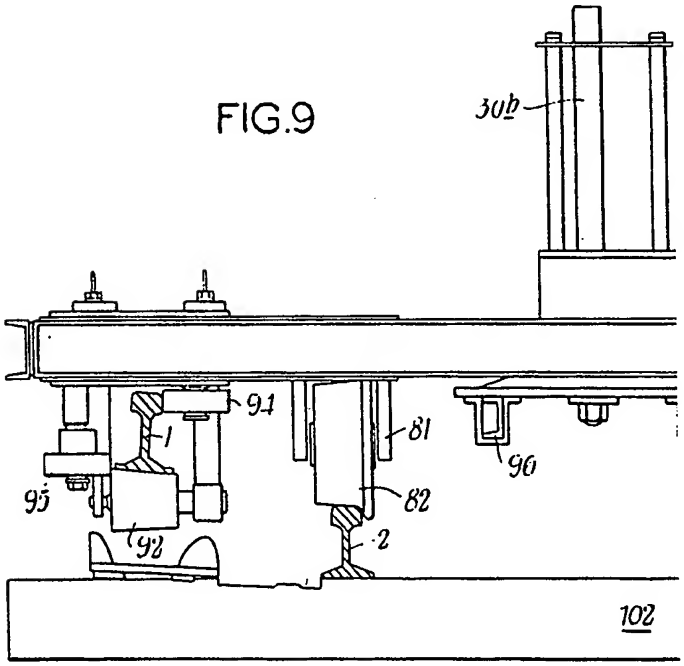


FIG.9



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54

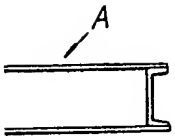


FIG.5

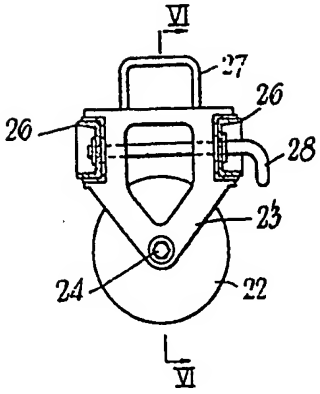
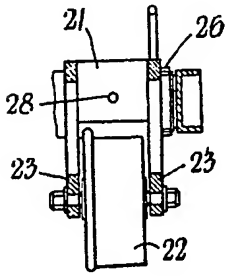


FIG.6



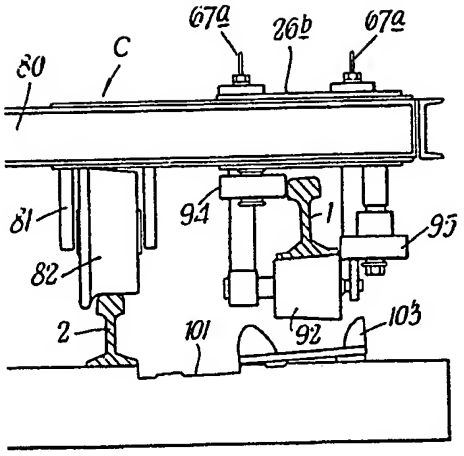
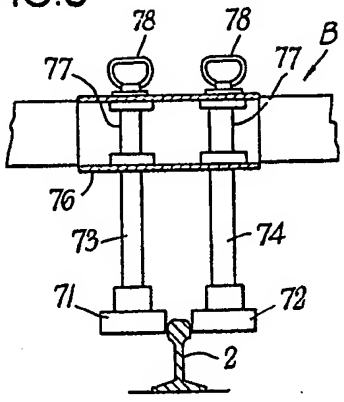


FIG.8



1,020,111 COMPLETE SPECIFICATION
4 SHEETS

FIG.4

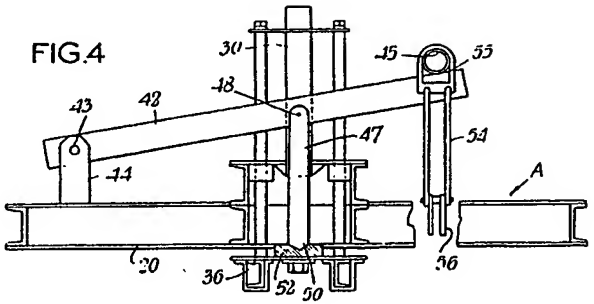


FIG.5

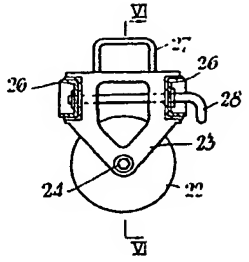


FIG.6

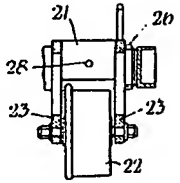


FIG.9

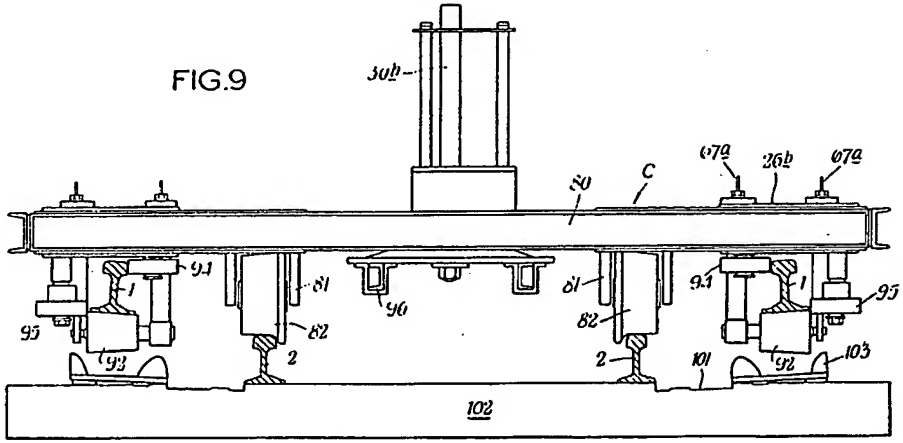


FIG.8

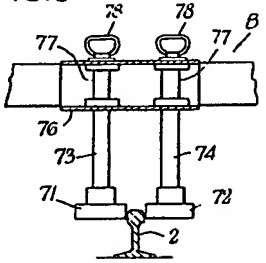


FIG.7

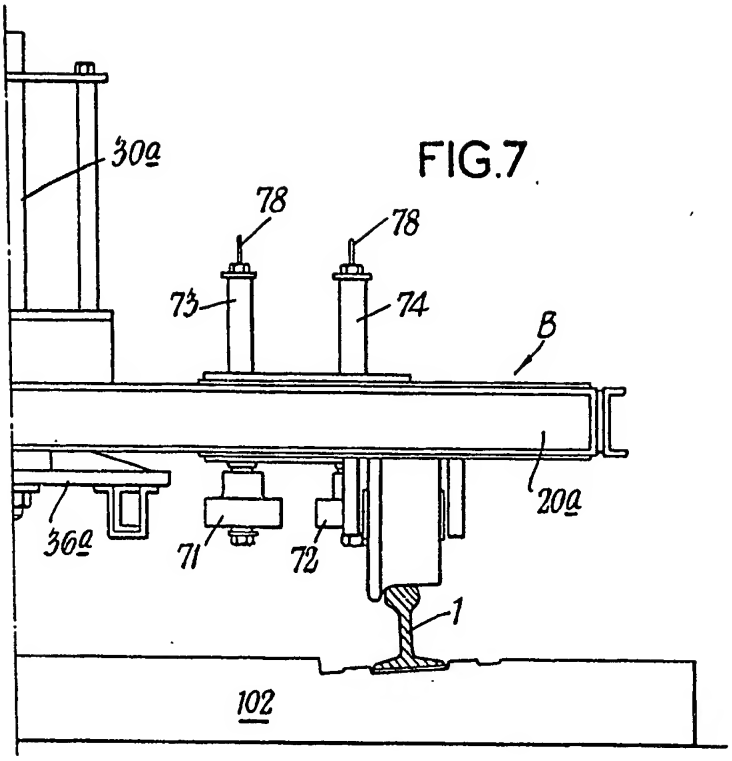
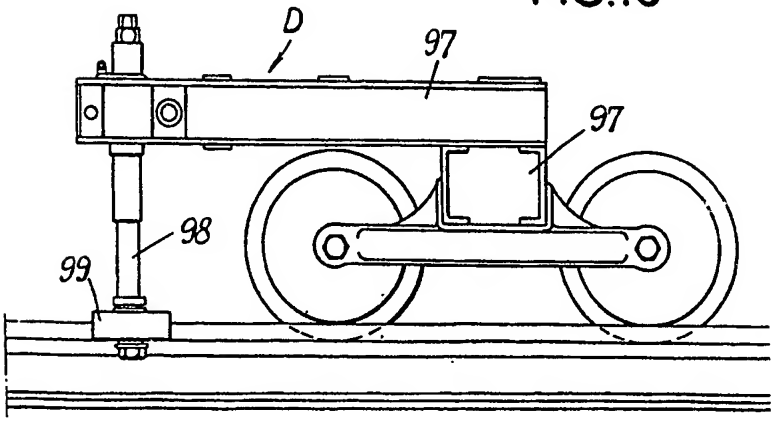


FIG.10



1,020,111 COMPLETE SPECIFICATION
4 SHEETS
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SHEETS 3 & 4

FIG.11a

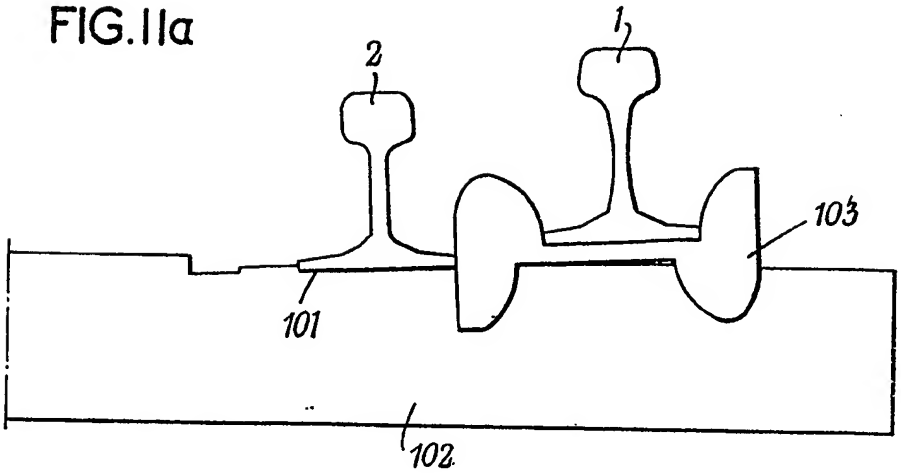


FIG.11b

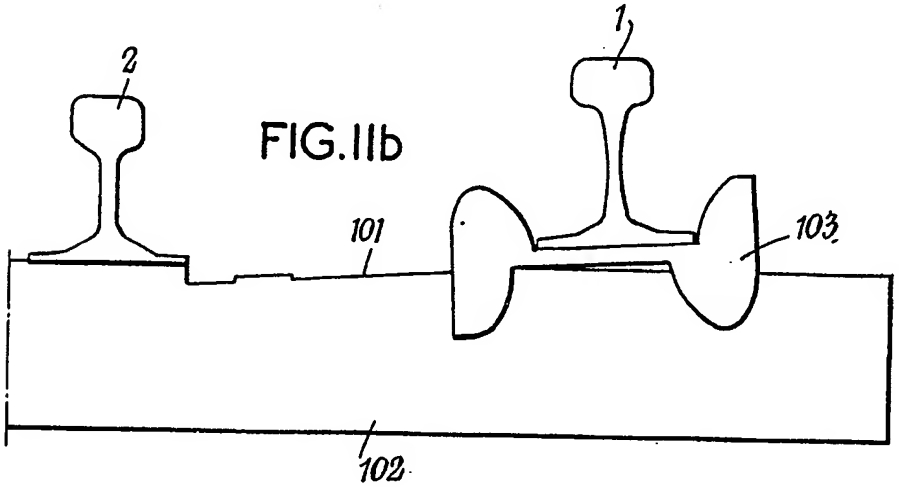
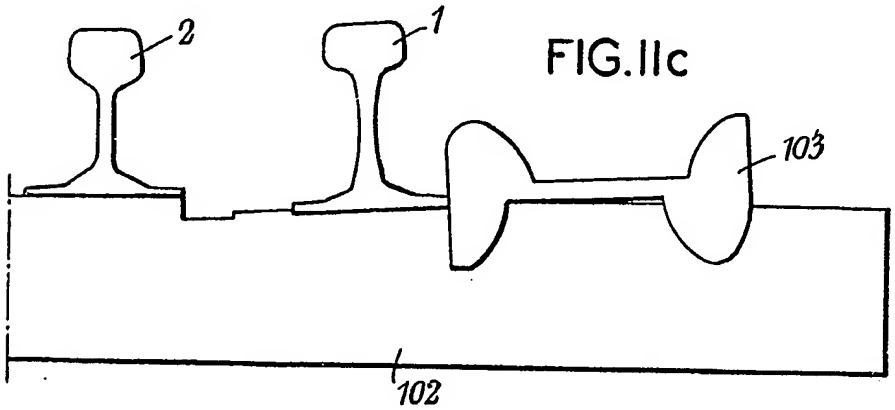


FIG.11c



1,020,111 COMPLETE SPECIFICATION
4 SHEETS

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SHEETS 3 & 4

FIG.7

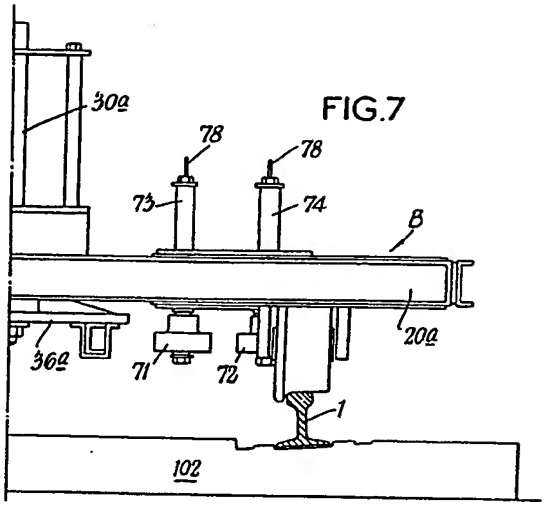

FIG.10

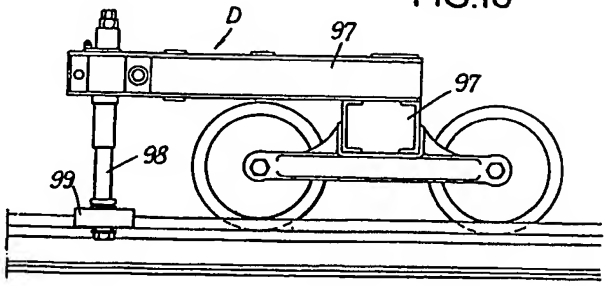

FIG.11a

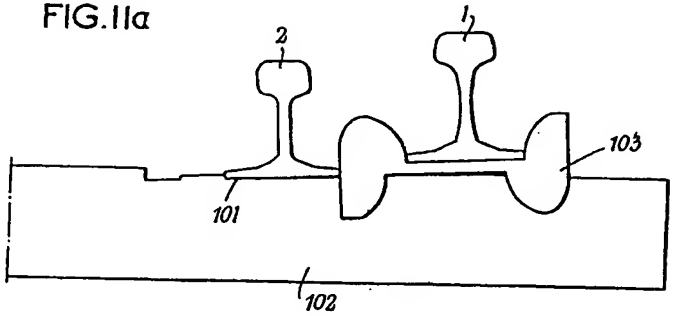

FIG.11b

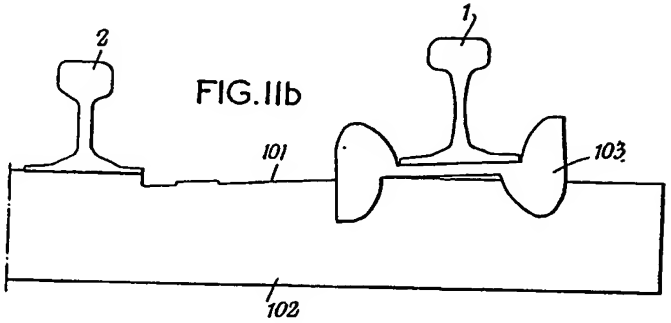

FIG.11c